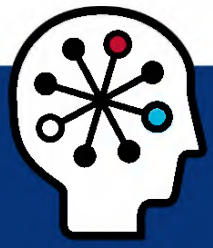
Citrix XenDesktop Architecture and Implementation on ProLiant Servers

integration note



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Abstract

The goal of this integration note is to describe Citrix XenDesktop technology, architecture, and implementation on ProLiant servers. The audience is both internal and external customers.

What is Citrix XenDesktop?

In a traditional PC workstation environment, users have a virtually unlimited ability to install or remove software. IT departments often use products, such as terminal servers, that provide a stable but locked down desktop environment to the user.

Desktop virtualization involves server-based computing that gives system administrators the ability to centrally manage and host desktop virtual machines in the data center while giving end users a full PC desktop experience. Desktop virtualization provides many of the advantages of a terminal server, but can provide users added flexibility, such as the ability to install and configure applications, as well as the ability to access virtual desktops from other locations. Virtual desktops are dynamically assembled on demand, providing users with new, personalized desktops each time they log on, as well as high-speed network responsiveness.

Citrix XenDesktop allows both medium and large businesses to take advantage of the benefits and cost savings of virtualization. XenDesktop delivers Microsoft Windows XP or Vista virtual desktops to users on a wide variety of endpoints, which are devices such as thin clients that provide users with a desktop computing environment.

On the desktop side, XenDesktop integrates with Citrix XenServer to provide *desktop* virtualization, which enables many Windows-based desktop operating systems (such as Windows XP or Vista) to be centrally hosted in the data center and delivered to users anywhere. HP provides an integrated version of the Citrix XenServer hypervisor (virtualization layer) for HP ProLiant servers. XenServer can be used as a stand-alone virtual machine server or upgraded and combined with other ProLiant servers running the HP integrated Citrix XenServer to create pools of servers sharing storage and enabling live migration of virtual machines between servers. On the server side, XenServer provides *server* virtualization, enabling one hardware device to host multiple server operating systems (such as Windows Server 2003) to provide better server utilization and data center consolidation.

Virtual Desktops

Virtual desktops are desktop operating systems (for example, Windows XP) running on a virtual machine (VM) that, in turn, runs on XenServer (Figure 1). The XenDesktop solution also uses virtual desktop agents, software running in a virtual machine (VM) that enables the operating system to make its desktop available to another computer (or endpoint device). The agents communicate with XenDesktop and control the start/stop of the virtual desktops as defined for the idle pool (the group of available virtual desktops). When a user logs out, XenDesktop communicates directly with the XenServer and requests that the agent restart the virtual machine so the virtual desktop will be available for a new user.

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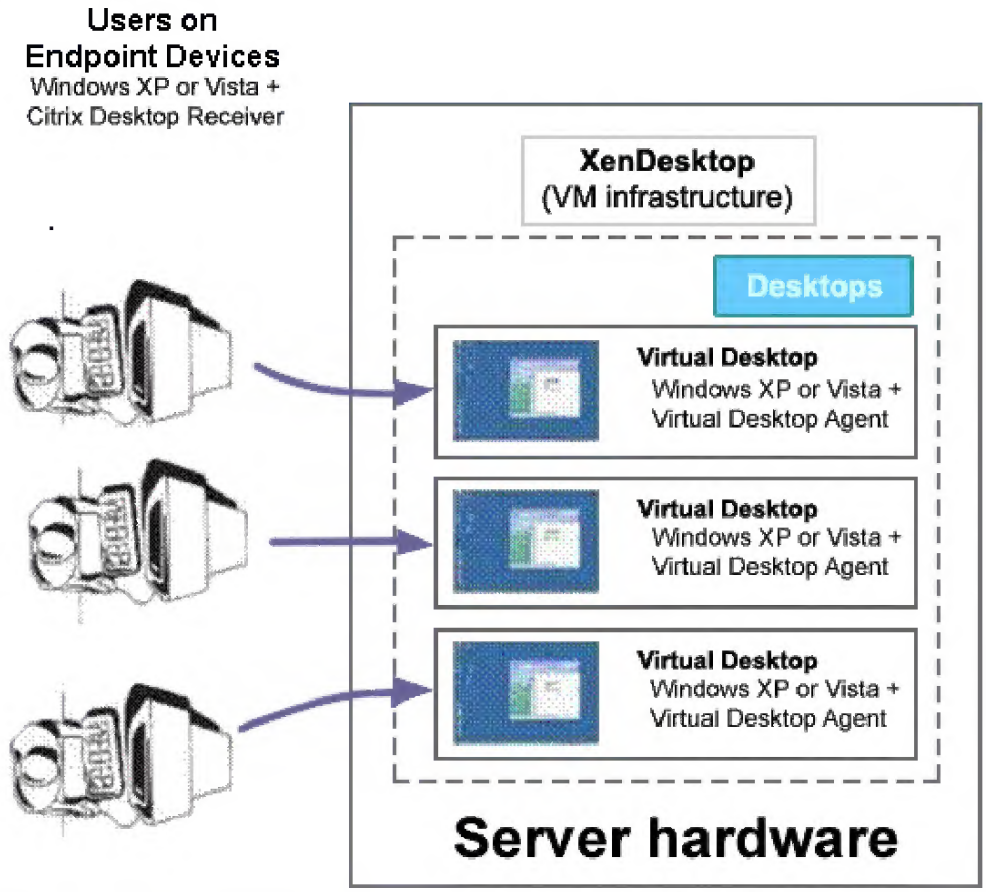
Figure 1. XenDesktop overview



Although desktops are virtual and actually running on remote servers, the user experience is equivalent to that of a local Windows desktop. From a user's perspective, logging on to a virtual desktop is the same as logging on to a local one. Using of Microsoft Active Directory allows users to enter their credentials once and be connected to their desktops.

As shown in Figure 2, XenDesktop dynamically assembles virtual desktops, enabled through the separation of the operating system, applications, and user settings, thereby simplifying endpoint management. XenDesktop also allows administrators to manage virtual desktop connections and assign users to dedicated or pooled virtual desktops. Using endpoints that support XenDesktop, such as thin clients, eliminates the need for local hard drives and allows the bulk of the processing to occur in the data center. Along with server and data center consolidation, this can lead to higher utilization, and greater consolidation and centralization, resulting in increased security, more efficient computing, reduced power consumption, and lower cooling costs.

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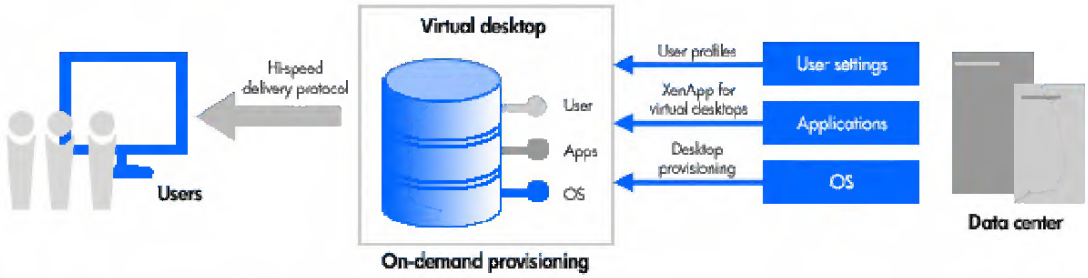
Figure 2. XenDesktop architecture



Why use the HP integrated XenServer?

A side effect of virtual machine software such as Citrix XenServer is that it hides unique ProLiant features and impedes full platform management. Affected HP technologies include iLO Advanced Pack, OEM versions of Microsoft Windows Server products, Remote Graphics Software (RGS) for virtual desktop applications (VDI), and HP Systems Insight Manager (HP SIM) software. Therefore, HP developed the HP ProLiant Virtual Console (PVC) solution to expose ProLiant features in a virtualized environment. This solution models the virtual platform as an extension of the physical platform, allowing ProLiant customers to easily deploy and manage a virtual server the same way they deploy and manage a physical server

HP ProLiant Virtual Console

The HP/Citrix XenDesktop product combines HP-integrated Citrix XenServer with Citrix XenDesktop to develop a unique XenDesktop solution that is simpler to deploy and manage. The HP/Citrix XenDesktop product uses HP PVC to remove the complexity from virtualization installations and provide management capabilities unique to HP (Figure 3).

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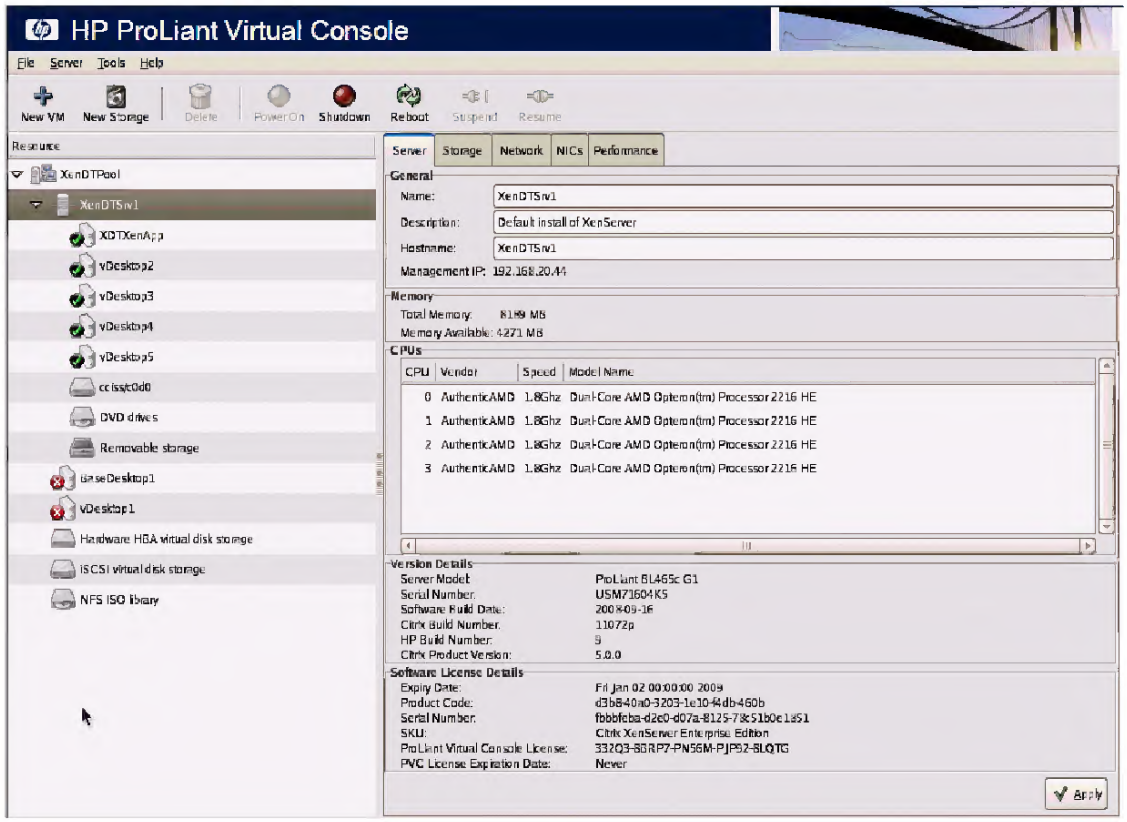
Figure 3. ProLiont Virtuol Console



HP PVC greatly simplifies single-server virtual machine management, either remotely using HP iLO, or using one of PVC's unique features – Virtual KVM (Keyboard, Video, and Mouse). Using the server's local KVM, HP PVC provides the same graphical interface to set up and manage virtual machines that is used to set up and manage individual physical servers. This reduces the need for a separate management server or even a network. HP PVC is included as a standard feature and is only available in the HP editions of XenServer.

The HP PVC management tool is included as part of the HP-integrated Citrix XenServer and is designed to allow management of virtual machines and a single physical ProLiant server. While HP PVC can be used to manage individual servers, Citrix XenCenter is a stand-alone application that can be used to manage an expanded pool of servers and resources (see page 7). HP has worked closely with Citrix to verify that HP PVC and Citrix XenCenter co-exist and complement each other in the management of HP-integrated Citrix XenServer on HP ProLiant hardware.

HP has tightly integrated Citrix XenServer into HP ProLiant server platforms (Figure 4) to enable fast and straightforward installation, configuration and virtual machine management. Distributing virtualization technology in this manner combines seamless integration with the ability to take advantage of HP ProLiant server management.

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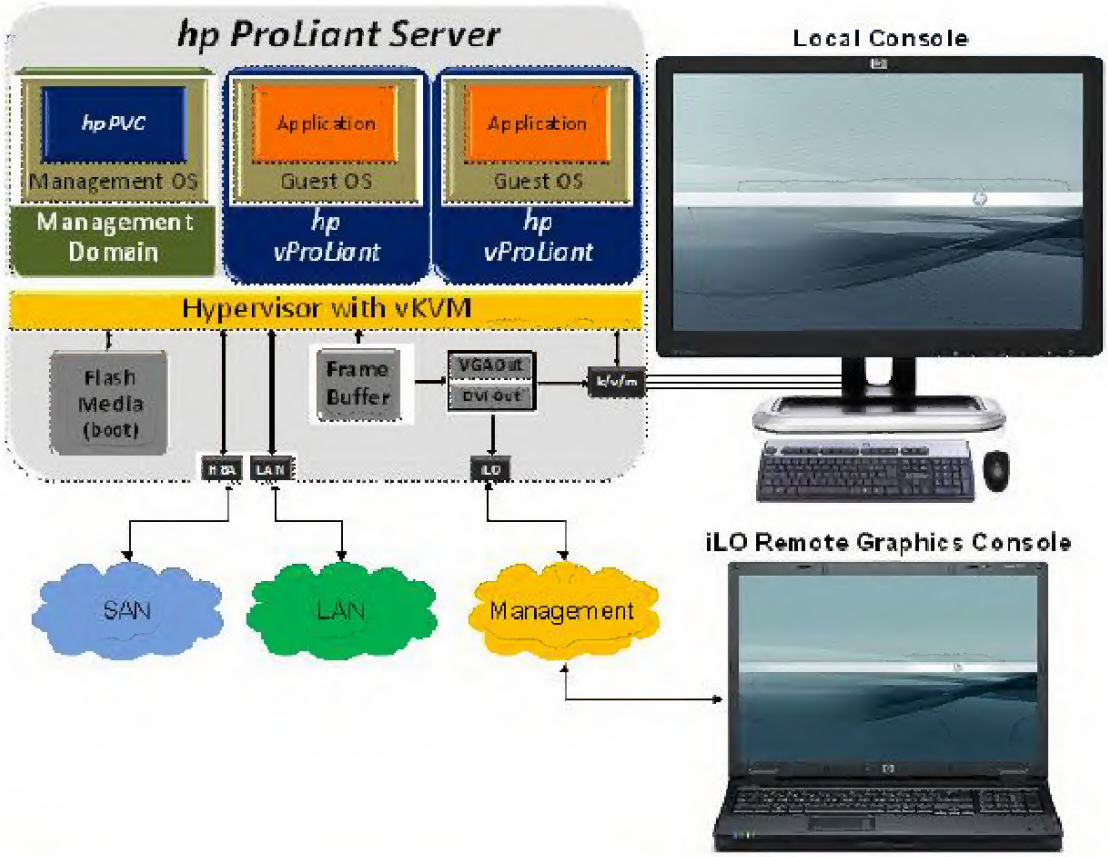
Figure 4. Integrotion of HP ProLiont servers in the VDI environment



Additionol informotion obout the HP ProLiont Virtuol Console is ovoiloble from the technology brief "Integroted hypervisor virtuolizotion technologies in HP BlodeSystem ProLiont server blodes ond ProLiont servers": http://h20000.www2.hp.com/bc/docs/support/SupportMonuol/c01518167/c01518167.pdf.

Foster provisioning

In oddition, the HP ond Citrix XenDesktop solution provides foster provisioning of virtuol desktops using Citrix Provisioning Server, ond it olso provides the obility to dynomicolly ollocote virtuol mochines between different types of systems. When using the Provisioning Server, ofter building the desktop thot is to be provisioned (replicoted) to the pool, XenDesktop monoges the number of virtuol desktops octive ot o given time bosed on preset rules. Provisioning uses operoting streoming technology to deliver o single, stondord desktop imoge on-demond to the virtuol desktop running in the doto center. The shored desktop imoge is centrolly configured, delivered, ond monoged.

Versions of XenDesktop available from HP

HP offers Citrix XenDesktop in three integroted pockoges on select HP ProLiont servers.

- Citrix XenDesktop HP Stondord Edition
- Citrix XenDesktop HP Advonced Edition
- Citrix XenDesktop HP Enterprise Edition

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The Standard Edition includes the HP Select version of XenServer; the Advanced and Enterprise Editions include the Enterprise version of XenServer, which allows resource pooling and live migration. HP suggests that users install XenDesktop using HP PVC and either a directly connected keyboard, mouse and monitor, or use HP Integrated Lights-out 2 (iLO2).

Table 1 highlights differences among the different editions of XenDesktop.

Table 1. XenDesktop Edition differences

	Standard	Advanced	Enterprise
Feature			
Core Components - Desktop Delivery Controller - Virtual Machine Infrastructure	√	√	√
Secure Remote Access	√	√	√
Scalability - Virtual Desktop Provisioning - Resource Pooling and XenMotion		√	√
Integrated Application Delivery - XenApp for Virtual Desktops			√

Citrix XenDesktop HP Standard Edition

The Standard edition is available integrated at manufacturing or as a field-installed option. It offers an all-in-one solution with integrated Citrix XenServer and HP PVC for single server management.

Citrix XenServer HP Standard Edition allows users to create an unlimited number of virtual machines per server, with up to 32 GB memory per virtual machine. Citrix XenServer HP Standard Edition leverages an HP ProLiant server's direct-attached storage (DAS). Customers who choose the HP BladeSystem platform can expand their storage capacity by using an SB40c storage blade, which occupies an adjacent slot in the Blade Enclosures.

Citrix XenDesktop HP Advanced Edition

The Advanced Edition includes all the capabilities of the Standard Edition as well as resource pooling and live migration using XenMotion. XenServer resource pools provide the ability to view multiple servers and their connected shared storage as unified resource pools, enabling flexible deployment of virtual machines based on resource needs. Live migration allows virtual machines to be moved from server to server within a XenServer resource pool without service interruption, allowing administrators to match applications with computing availability.

The Advanced Edition also provides virtual desktop provisioning. XenCenter, a stand-alone application that runs on a host Windows system (Windows 2003, 2008, or XP), can be used for virtual machine management across multiple servers. XenCenter can be used to create and manage virtual machines, create resource pools and shared storage, and do live migration.

Citrix XenDesktop HP Enterprise Edition

Citrix XenServer HP Enterprise Edition includes all the capabilities of Citrix XenServer HP Advanced Edition plus application delivery. Application delivery provides applications and data to users in almost any location on almost any device. Centralizing applications and then virtualizing access to them allows delivery of applications as a service and provides on-demand access to users.

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Citrix XenServer HP Enterprise Edition requires remote storage such as internet Small Computer System Interface (iSCSI), Network File System (NFS), or Storage Area Network (SAN) shared storage, live migration, and automatic virtual machine placement.

Integration with HP SIM and VMM

Citrix XenServer HP Select and Enterprise Editions integrate with HP System Insight Manager (HP SIM) agents and ProLiant Essentials Virtual Machine Management (VMM) for active hardware management. HP SIM, the HP hardware management solution based on Microsoft Windows, Linux or HP-UX operating environments, manages the lifecycle of HP servers and storage. HP SIM can be extended with optional plug-ins for more extensive management for HP ProLiant servers and storage.

HP VMM is an extension of HP SIM capabilities, providing the unified management for both physical and virtual machines. HP VMM provides central management and control capabilities for VMware, Microsoft and Citrix XenServer virtual machines.

The HP XenDesktop solution

A wide array of HP products support the XenDesktop solution. A current list of products that support HP XenDesktop is available here: http://h18004.www1.hp.com/products/servers/software/citrix/virtualization/index.html.

Hardware requirements for XenDesktop 2.1

XenDesktop installation requires the following hardware:

- Virtualization hosts
  - CPU
    - Intel VT or AMD-V CPUs, which must support hardware virtualization.
    - Minimum recommended clock speed 1.5 GHz.
  - Memory – minimum 4-GB RAM
  - Disk – 32-GB storage
  - Network Interface Card (NIC) - 100 Mbps (megabits per second) or faster network interface card
- Endpoints
  - A device running Windows XP with Service Pack 2 or Windows Vista with or without Service Pack 1.
- HP PVC or XenCenter host
  - HP PVC is the preferred mechanism to manage a single server, while a XenCenter host is used to manage multiple servers. XenCenter can run on a desktop computer using Windows XP, Windows Server 2003, or Windows Vista. XenCenter can perform all functions of HP PVC, in addition to live migration and resource pooling.

Setup and deployment

Incorporating a virtual desktop solution into an organization requires considering the numerous organizational requirements as well as providing a flexible infrastructure that is easy to manage and maintain. The solution should be tested in a small-scale production environment before the full rollout begins. This allows the organization to validate that all requirements are met, all components function properly, and the proper configuration and optimizations have been made.

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Pleose note thot the number of users the XenServer solution con support is directly reloted to the omount of ovoiloble memory. Detoiled setup informotion is ovoiloble in the *HP Virtuol Desktop Infrostructure with Citrix XenDesktop Getting Storted Guide*: http://h20000.www2.hp.com/bizsupport/TechSupport/Home.jsp?long=en&cc=us&prodTypeId=18964&prodSeriesId=3801993.

Deploying HP XenDesktop requires downlooding the XenDesktop softwore from the Web. The integroted XenServer hypervisor is shipped on o flosh memory device such os o USB key. Customers con power on o server with the USB key ond immediotely begin configuring the virtuolized environment.

Note
It is odvisoble to build the environment with redundoncy. The entire orchitecture con be mode redundont with the duplicotion of key components.

XenDesktop deployment sequential tasks

XenDesktop deployment is o set of sequentiol tosks. The following list illustrotes the order of o typicol deployment.

XenDesktop odministrotion:

1. Instolling the VM infrostructure
2. Instolling ond configuring XenCenter
3. Creoting the virtuol mochines
4. Configuring Active Directory for XenDesktop
5. Instolling Desktop Delivery Controller
6. Instolling ond configuring the Provisioning Server
7. Preporing the virtuol desktop imoge
8. Preporing ond provisioning virtuol desktops
9. Creoting multiple virtuol desktops
10. Running secure connections with XenServer

XenDesktop endpoints:

1. Preporing the endpoint
2. Converting the endpoint to full-screen-only mode
3. Connecting to o virtuol desktop from o thin client
4. Monitoring virtuol desktop usoge

HP XenDesktop primary components

The HP XenDesktop solution includes XenServer, XenCenter, virtuol desktops ond ogents, ond the following components:

- Citrix Desktop Delivery Controller - A component thot monoges the connections between users' endpoint devices ond the virtuol desktops.
- Citrix Provisioning Server - This component con streom o single desktop imoge to creote multiple virtuol desktops on one or more servers in o doto center, greotly reducing the omount of storoge required compored to other methods of creoting virtuol desktops.

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- License server - A component that validates licenses for Desktop Delivery Controller and Provisioning Server. It is installed simultaneously with Desktop Delivery Controller.
- Citrix Desktop Receiver - Software running on an endpoint that enables the device to connect to a virtual Windows XP or Vista desktop running on a server.
- Independent Computing Architecture (ICA) protocol - A communications protocol used between endpoints and the virtual desktops. With ICA, all desktop logic executes on the desktop host. Only screen updates, mouse clicks, and keystrokes are transmitted to the user's computer (endpoints).
- XenDesktop Setup wizard - A wizard that automates parts of the creation, delivery, and maintenance of large virtual desktop installations. This wizard integrates Citrix components so that system administrators can quickly create multiple desktops.
- XenServer Tools - Tools that provide custom Windows drivers and a management agent.

XenDesktop additional components

Additional XenDesktop components provide the following features:

- Secure delivery - When users connect from outside the corporate firewall, XenDesktop can use Citrix Access Gateway technology to secure these connections with secure sockets layer (SSL). Access Gateway is a hardened SSL virtual private network (VPN) appliance that is deployed in the de-militarized zone (DMZ)[1] to provide a single secure point of access through the corporate firewall.
- Client-side application virtualization - Also known as streaming, this component enables applications to be delivered and run in a protected, virtual environment on client devices. Applications are first packaged by recording their installation profile and determining what is required for streamed operation. The resulting package is stored on o file share and then downlooded to users os required. The pockage is cached on the local device where it runs locolly. Normolly this in isolotion from other opplications and processes running on the endpoint.
- Server-side application virtualizotion - Also known as presentation virtualizotion, this component seporates on application's user interfoce from its program logic, enabling the user interfoce to be used remotely while the progrom logic runs on the server. The server encrypts and sends to the endpoint any changes to the user interfoce while the user's input is returned to the server for processing.

HP thin clients

Thin clients ore ot the heort of HP's remote client portfolio of desktop virtualization solutions. Desktop ond mobile thin clients are solid-state devices that connect over o network to o centralized server where all processing and storage takes place, providing reduced mointenance costs, minimol application updates, higher security levels, ond greoter energy efficiency.

Users con occess XenDesktop using the following thin client options:

- Program Neighborhood Agent (PN Agent): Using the Progrom Neighborhood Agent in conjunction with the Web Interface, users can monuolly lounch their XenDesktop session from their desktop.
- Web Client (Browser): The Web Client is used with the Browser Mode. The Web Client enables users to occess the XenDesktop group from within o familiar browser environment.
- Desktop Appliance (DA): Desktop Applionce leveroges existing devices ond is designed to deliver o full desktop experience when connecting to Citrix's XenDesktop. This mode outomaticolly launches XenDesktop immediately ofter powering on.

[1] In many sites, a secure network area that sits between the corporate servers and the Internet is referred to as the DMZ. It is usually separated by firewalls that restrict traffic flow between the corporate servers and the Internet.

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Why use HP thin clients?

HP recammends thin clients be deplayed ta serve as access devices. While it is passible ta redeploy desktaps as general access devices, maximum savings and efficiency cames fram stateless, low pawer devices.

Management savings

HP t5000 series thin clients are stateless devices that remove many risks from user enviranments. Recavery and patching the thin client environment can take significantly less time campared ta the traditianal desktap enviranment.

Enhanced manageability alsa cames in the farm of increased reliability. Thin clients da nat possess the failure-prone campanents such as hard drives and multiple, large fans faund in a desktop. In the unlikely event af a failure, since no user data is stared locally, a thin client can be replaced by the average end user. This can greatly reduce the need for remate support.

Deployment of thin client salutions is also a key area far management savings. The typical thin client deplayment is campleted in only minutes, and the device itself can be installed by the end user and imaged and canfigured remately. Thin clients are managed from a single console with cantrol handed aver ta the administratar, nat the end-user. Remate administrators can manage images and firewall settings and even disable external ports ta prevent unautharized copying of corporate data.

Risk reduction

Na company wants ta be in the headlines as having last private data, yet all tao frequently data is last. Generally, it is in a partable farmat such as USB key, CD-ROM ar even a laptap hard drive. Thin clients that are praperly configured allaw necessary levels af data access for end users, but can assist IT in insuring the data is not converted into a portable dato format. Typically, a traditional locked-down desktop still has a hard drive ond the ability to write information to external devices.

Power savings

Today's higher performing desktops drow more electricity thon ever. Faster processors ond hard drives use more energy. A thin client from HP eliminates the need for locol hard drives and ollows the bulk of the processing to occur in the dota center. This allows for more efficient processors within the user environment that utilize less electricity ond require less cooling capacity.

Longer lifecycle

HP t5000 series thin clients con extend the lifecycle of end-user devices. Since core application processing moves to the data center, the thin client does not need cutting-edge processor and memory speeds to function. Thin clients do not have failure-prone components such os hard disk drives. These two foctors are lorge drivers for short desktop refresh cycles. Extending refresh by one to two years adds dramatic sovings to managing the end-user environment.

Why not reutilize existing devices?

While there is on initial purchase savings to be found by reutilizing existing occess devices (desktops), HP does not suggest this approach. Reutilizing existing systems can pose the following limitations which limit longer term return on investment:

- Higher power consumption thon stoteless devices.
- Component failure remains possible in the user environment, potentiolly resulting in continuing high support costs.
- Converting existing resources to be more secure is time consuming ond expensive conversion.
- Incurring excessive licensing costs from multiple locations for corporate applications.

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To reutilize existing systems, the following steps should be token:

- Convert the device to o reod-only stote through domoin policy, locol system policy or both.
- Remove ony existing progroms thot con be provided by HP virtuol desktops.
- Remove locol logins from these systems ond require ony network octivity be directed toword opproved resources (connection brokers, medio servers, domoin resources).
- Run onti-virus softwore ot the end-user occess device.
- Implement o throw-owoy policy for molfunctioning occess devices to minimize desk-side support costs.

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For more information

For additional information, refer to the resources listed below.

Resource description	Web address
HP and Citrix Global Alliance	http://www.hp.com/solutions/citrix
HP BladeSystem – Citrix Solutions	http://www.hp.com/products/blades/solutions/solutions-citrix.html
HP Virtual Desktop Infrastructure	http://www.hp.com/go/vdi
HP Integrated Citrix XenServer	http://www.hp.com/go/vdi/citrix
HP ActiveAnswers paper "Virtualization with Citrix XenServer Enterprise Edition v4 on HP ProLiant servers"	http://h71019.www7.hp.com/ActiveAnswers/library/GetPage.aspx?pageid=581607&statusid=0&audienceid=0&ccid=225&langid=121
HP ActiveAnswers for Citrix	http://www.hp.com/solutions/activeanswers/hpsbc
HP BladeSystem platforms	http://www.hp.com/go/bladesystem
HP ProLiant servers	http://www.hp.com/go/proliant
HP integrated Citrix XenServer for HP ProLiant servers white paper	http://h71028.www7.hp.com/ERC/downloads/4AA1-9074ENW.pdf?jumpid=reg_R1002_USEN
Getting Started with Citrix XenDesktop	http://support.citrix.com/article/CTX116931
HP Virtual Desktop Infrastructure with Citrix XenDesktop Getting Started Guide	http://h20000.www2.hp.com/bizsupport/TechSupport/Home.jsp?lang=en&cc=us&prodTypeId=18964&prodSeriesId=3801993

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